

~~CEOS~~ LAND PRODUCT



SUBGROUP

Update to MODIS land discipline team

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LPV outline



- **Review of Working Group on Cal/Val plenary and field campaign**
- **Review of LPV workshops**
 - Past
 - Planned
- **Ongoing LPV activities**
 - CEOS Core Sites (with WGISS)
 - Special Issue – in progress
 - Web site update
- **LPV concluding remarks**

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Review of WGCV meeting



- A lot of discussion on the interaction between CEOS working groups and GEOSS
- First joint
Working Group on Cal/Val
Working Group on Information Systems & Services
- First attempt at field exercise in conjunction with a WGCV plenary meeting

CEOS/WGCV/LPV Organizational Structure



CEOS

Committee on Earth Observing Satellites
(NASA rep = **Ron Birk**)



WGCV

Working Group on Cal/Val
(NASA rep = **Garik Gutman**
Current Chair Steve Ungar/Goddard)



LPV

Land Product Validation Subgroup
(NASA rep & current chair =
Jeff Morisette
Past chair = Jeff Privette)

Goals for field campaign



- Add a South American agricultural site to the LAI-intercomparison activity
- Test the three different LAI measuring instruments' sensitivity to sun light conditions
- Develop a MODIS land cover reference map of detailed agricultural information
- Related to the field campaign – build on the “Global Observation of Forest Cover/Land Dynamic” (GOFC/GOLD) South American Network.

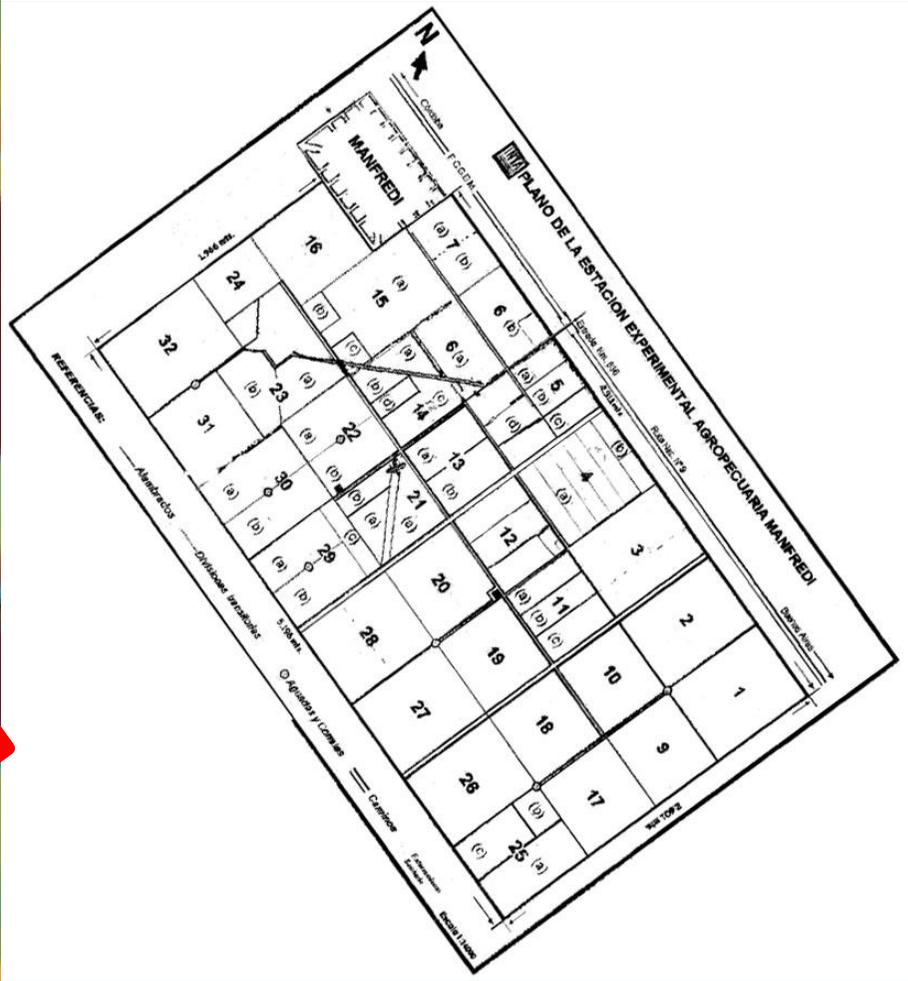
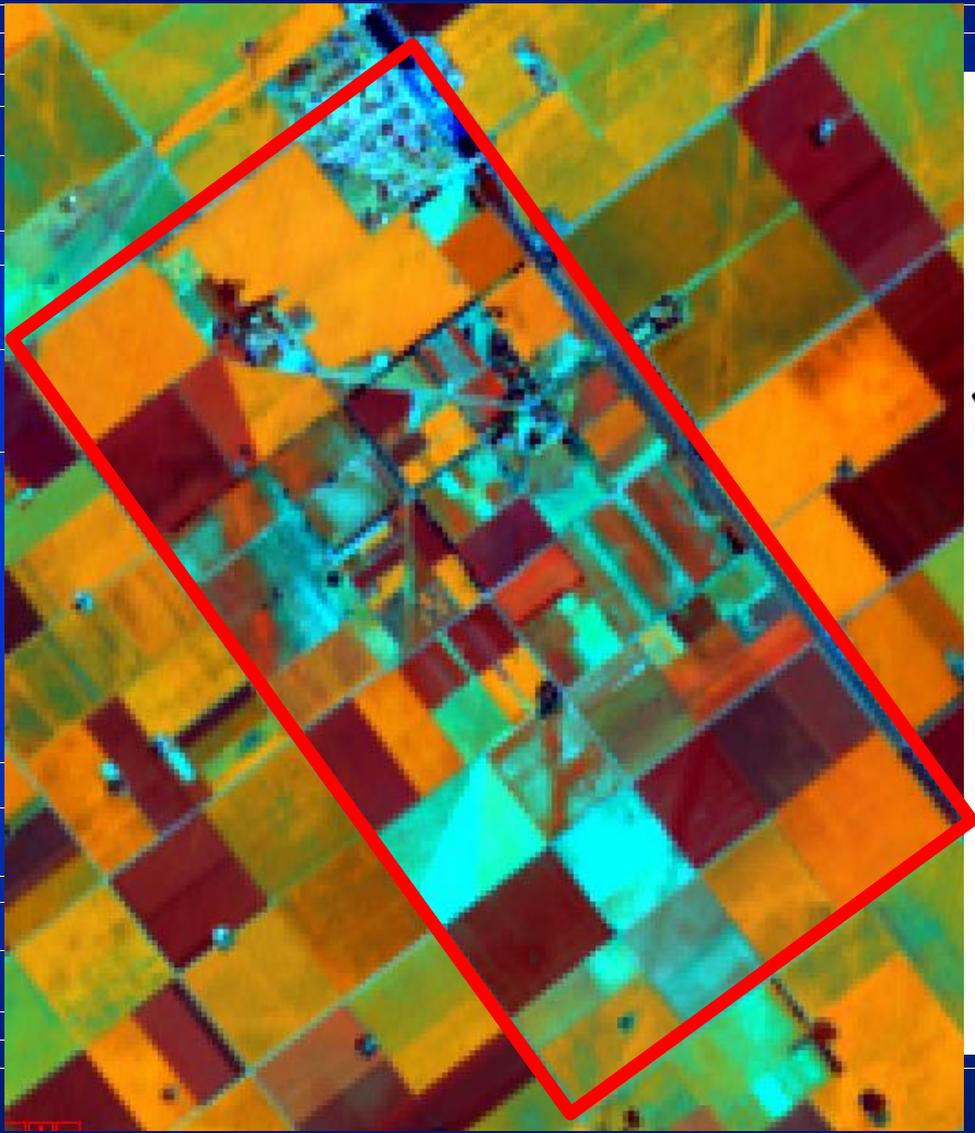
Data Collection



- Field Spectrum
- Sun photometer
- AccuPAR
- Digital Hemispherical photos
- Field Survey of entire Manfredi site

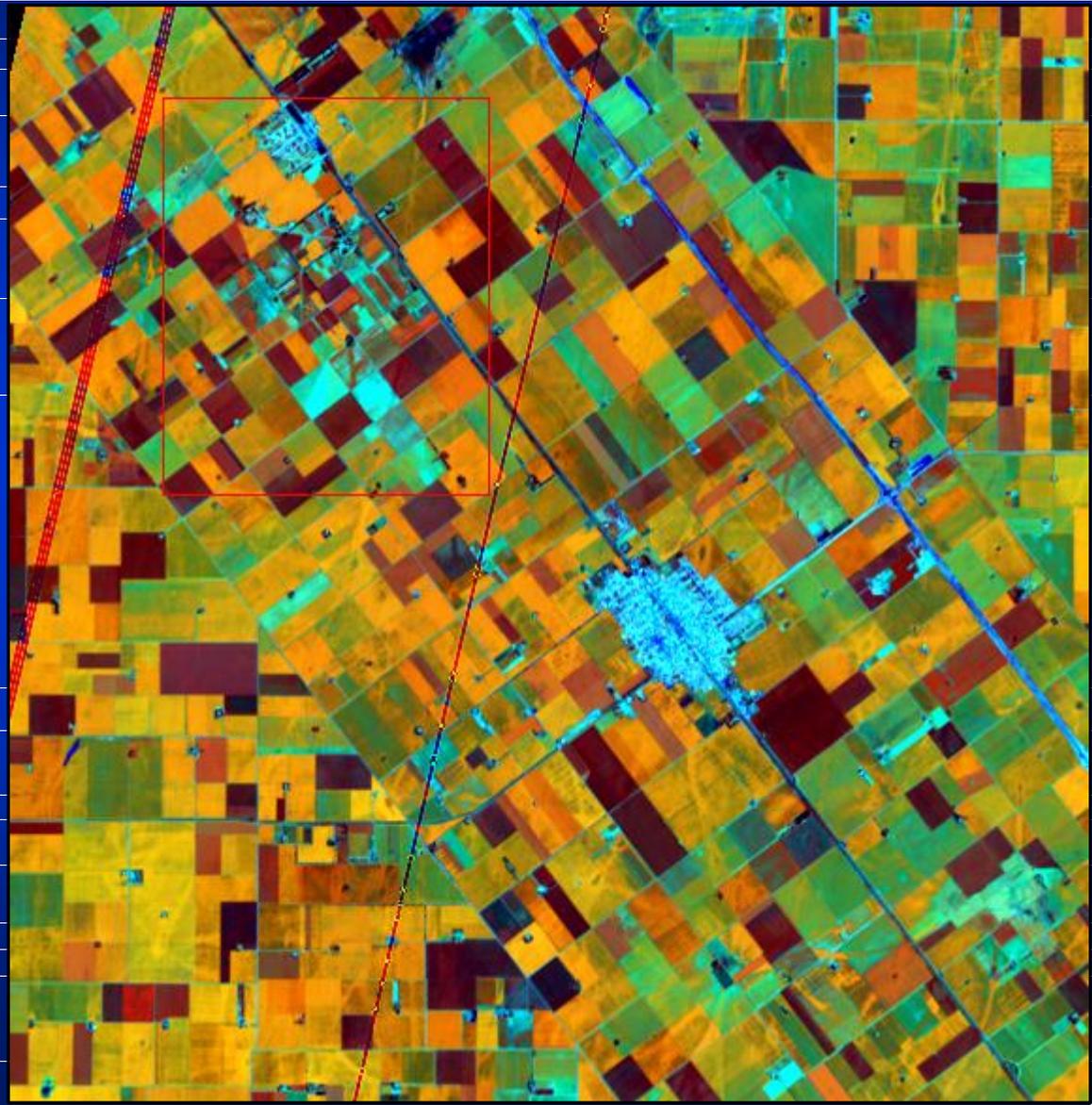
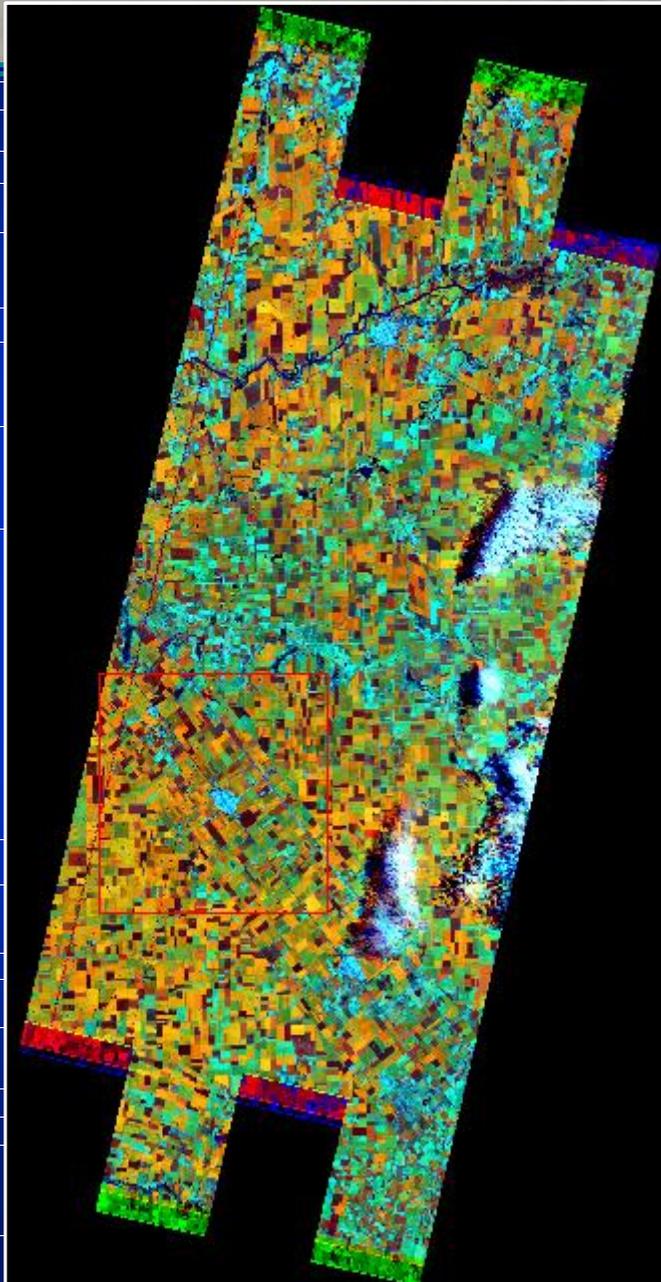


Manfredi INTA Site



EO1-ALI Image

WRS2 229/082
21 Jan 2005, 695 (RGB)



Sky condition experiment



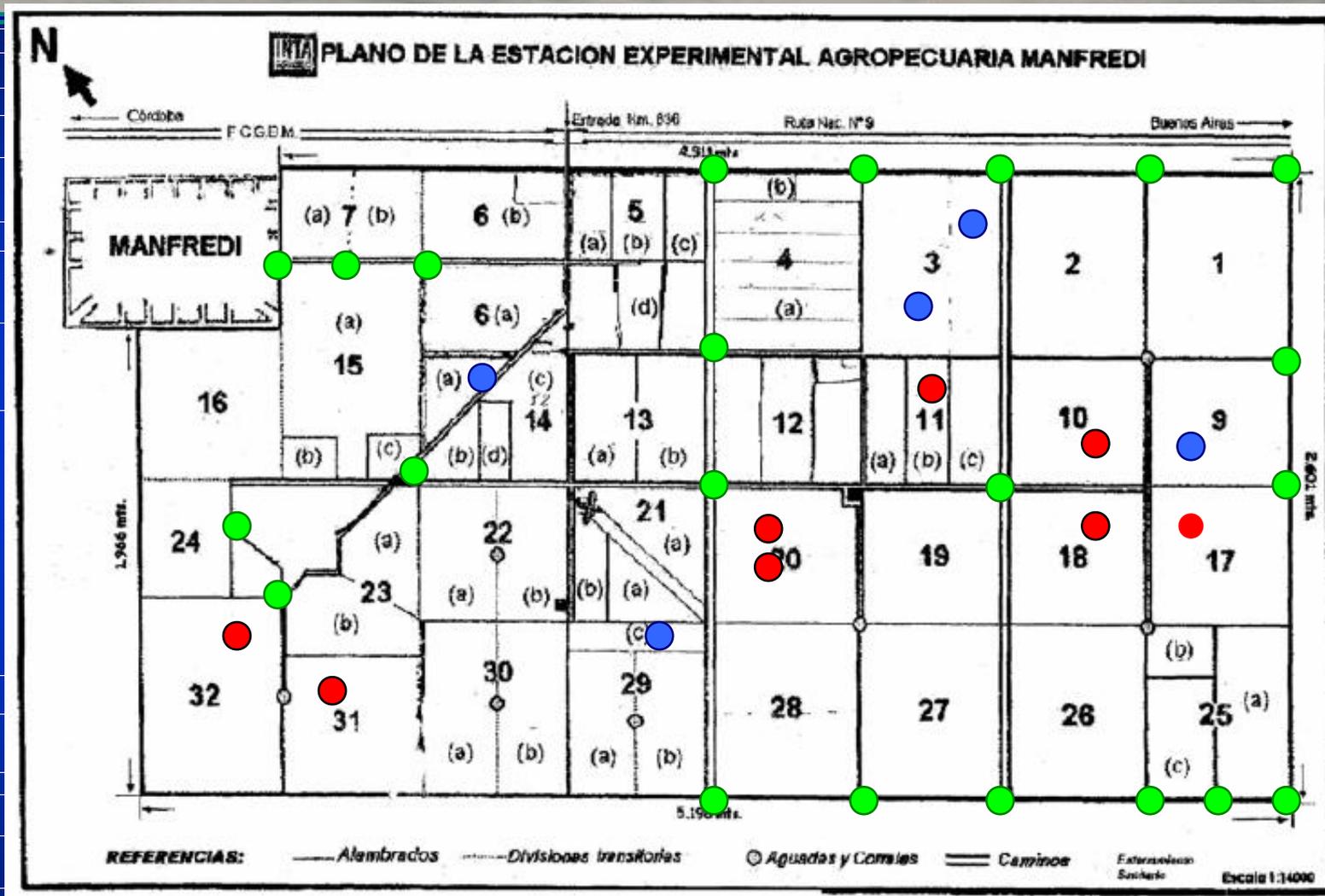
Corn – diffuse lighting

Sky condition experiment



Corn – full sun

Manfredi Fieldwork, March 2005



- Sunlit Measurements / ESU (8)
- ESU Only (13)
- Land Cover GCP (34)

Lessons learned from field exercise

It is feasible to conduct a (somewhat limited) field campaign in conjunction with a WGCV plenary meeting

More lead-in time

- for instruments to be gathered and shipping documents to be gathered
- buy-in from CEOS members to acquire and share “tasked” satellite data

Focus on an area/topic of “user concern” where field work can help the user with the data or improve the product for a particular need

- Perhaps within one of the GEOSS focus areas

May need to add an “outreach” component to bring together CEOS producers and local users to help define the goals of the campaign and follow-up with the data from the campaign

Might consider conducting field campaigns every-other meeting, with a “results” workshops staggered in-between

All CEOS members need to step-up with acquisition of any high-resolution satellite data that need to be tasked

- Main constraint on LAI validation will be acquisition date of cloud free high-res data (hoping to get EO-1 and/or ASTER)

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Topical workshops



- **Results workshop for LAI-intercomparison**
16 August 2004, University of Montana, Missoula, USA
Established an agreement for data sharing and a paper submitted to the special issue
- **Ground-based Accuracy Assessments for Fire Occurrence and Deforestation Events**
26 July 2004, Brasilia
Part of the Large scale study of the Biosphere and atmosphere in Amazonia (LBA)
- **GOFC-GOLD/FAO Workshop on Harmonization of Global Land Cover Products**
15-16 July 2004, FAO in Rome
A manuscript on this issue has been submitted to the special issue

Upcoming...

- **Albedo/BRDF Intercomparison**
April 2005 Austria, Vienna (in conjunction with EGU)
- **Continuous Fields validation**
late summer 2005, location to be determined...
- **Validation of multi-sensor time series**
2006, location to be determined...
perhaps in conjunction with other disciplines
perhaps associated with a "sustainable agricultural and desertification" mtg.

INTEGRATION WITH GLOBAL OBSERVING SYSTEM FOR CLIMATE IMPLEMENTATION PLAN



Essential Climate Variable for land:

River Discharge	Permafrost & seasonally frozen ground
Lake Level/Area	Albedo
Ground Water	Land Cover
Water Use	fAPAR and LAI
Snow Cover	Biomass
Glaciers and Ice Caps	Fire Disturbance

MODLAND validation will watch if & how these are adopted into NASA priority climate data record

LPV will watch if & how these are adopted by GEOSS

WMO, 2004. Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC, October, GCOS - 92, WMO/TD No. 1219, United Nations Environment Programme International Council.

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CEOS Core Sites



	ETM+	MODIS	ASTER	SRTM	NED	Lidar	AVHRR	SPOT VEG	MERIS	CHRIS
Barton Bendish	X	X					O	O	X	
Boreas North	X	X	X				O	O	X	
Harvard	X	X		X	X		O	O	X	
Mongu	X	X	X				O	O	X	
Puget Sound	X			X	X	Link	O	O		
Railroad Valley	X		X	X	X		O	O		
Southwest Amazon							O	O		
Uardry	X	X					O	O	X	

X = data at USGS/EROS
O = "distributed data"

CEOS Core Sites

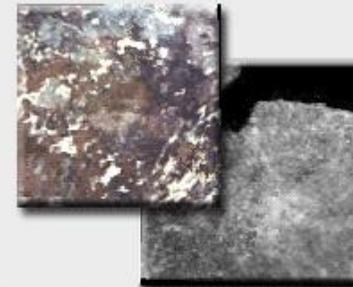


National Center, EROS - WGISS & WGCV Test Sites



CEOS Working Group on Information Systems and Services Test Facility for the Working Group on Calibration and Validation -- Land Product Validation Test Sites

This prototype is being developed in partnership between the Working Group on Calibration and Validation (WGCV <http://wgcv.ceos.org>) and the Working Group on Information Systems and Services (WGISS <http://wgiss.ceos.org>) and provides a good opportunity to demonstrate and improve upon the suite of WGISS tools and services that can be applied to assist with land product validation activities. This prototype is only one example of what can be done through CEOS collaboration efforts."



<http://edcsgs16.cr.usgs.gov/wgiss/>

LPV “Special Issue” – ongoing

- Special Issue: describing the state of the art research on both protocol and results for validation and accuracy assessment of global land products (Liang, Baret and Morisette, eds.)
- MODIS related = VI(2), LAI(8), Fapar(2), NPP/GPP(2), LST(1), LC(2), fire(1)
- Others = LC(3), BRDF(2)
- Several members from the user community have agreed to write a note for each section on the implication for the uncertainty/validation of the products (land cover, fire/burn), but still need an article on biospherical parameters.

	2004												2005					2006						
	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	N	D	J	F	M
Announcement																								
Validation papers				submissions					reviews				revisions		review		final/profs							
User perspective papers							submissions							reviews		revisions		final/profs						
Publication date																				March 2006 ->				

MODIS example: "Accuracy Statements" (1/3)

Welcome to the EOS Land Validation Home Page - Microsoft Internet Explorer

Address: <http://landval.gsfc.nasa.gov/MODIS/>

MODIS land team validation

Home Core Sites Val Status Campaigns Documentation

News:

- [MODIS Vegetation workshop II](#), University of Montana, 17-19 August 2004
- [MODIS Land Data Operational Product Evaluation \(LDOPE\) software tools](#) now available to assist with the analysis and quality assessment of the MODIS Land products.
- [Call for Papers - TGARS Special Issue on Global Land Product Validation](#)
- Coordinated MODIS land validation activities will continue through the recently funded proposal: [Maintaining and Refining NASA's Land Product Validation Infrastructure](#)

MODIS News

- [Terra](#)
- [Aqua](#)

Landsat 7 News

- [Landsat ETM+ Dataset Transition](#)
- [Report following the Scan Line](#)

MODLAND Validation

MODLAND product quality assurance (QA) and Validation. The MODLAND team contributes to and leverage off of international validation standards and activities through close coordination with the Committee on Earth Observation Satellites (CEOS) [Land Product Validation](#) subgroup, under the Working Group on Calibration and Validation ([WGCV](#)).

MODLAND uses several validation techniques to develop uncertainty information on its products. These include comparisons with in situ data collected over a distributed set of validation test sites, comparisons with data and products from other airborne and spaceborne sensors (e.g., SeaWiFS, AVHRR, MISR, TM/ETM+, ASTER), inter-comparison of trends derived from independently obtained reference data and MODLAND products, and analysis of process model results (including EOS Interdisciplinary Science models) which are driven or constrained by MODLAND products.

MODLAND's primary validation technique includes the collection of and comparison with field and aircraft data, and comparison with data and products from other satellites. The infrastructure for these efforts has resulted in the establishment of a semi-permanent array of EOS Land Validation [Core Sites](#), most of which include a flux tower, for extended temporal measurement of terrestrial biophysical dynamics over a range of landcover types. Field data are archived in cooperation with the [Oak Ridge DAAC's](#) Mercury system. Results of all validation activities are conveyed to the end-user through both published literature and the Land Product [Val Status](#)

Product "pick-list"

Albedo/BRDF
 Fire
 LAI/Fpar
 Land Cover
 Land Surface Temperature
 Net Primary Production
 Snow/Ice Cover
 Surface Reflectance
 Vegetation Cover Conversion
 Vegetation Indices

Quality Assurance (QA) and Validation. The MODLAND team contributes to and leverage off of international validation standards and activities through close coordination with the Committee on Earth Observation Satellites (CEOS) [Land Product Validation](#) subgroup, under the Working Group on Calibration and Validation ([WGCV](#)).

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MODIS example: "Accuracy Statements" (2/3)

The image shows two overlapping browser windows. The background window is the "Welcome to the EDS Land Validation Home Page" with a navigation menu and a "validation" banner. The foreground window is titled "EOS Validation Status for MODIS Surface Reflectance: MOD09" and displays the "EOS Land Validation core sites" header. Below this, the "Status for: Surface Reflectance (MOD09)" section is highlighted in yellow. It contains a "General Accuracy Statement" which states that validation at stage 1 has been achieved for the surface reflectance product (MOD09), with an accuracy better than 5% reflectance or 5% of the signal. Other sections include "Supporting Studies" (with a highlighted title: "Atmospheric correction of MODIS data in the visible to middle infrared: first results"), "Additional Validation and Product Quality", and "Summary Figures and Tables". A blue arrow points from the "validation" banner in the background window to the "General Accuracy Statement" in the foreground window.

Accuracy Statement for each product

EOS Land Validation core sites

Status for: Surface Reflectance (MOD09)

General Accuracy Statement

Validation at [stage 1](#) has been achieved for the surface reflectance product (MOD09). The accuracy of the MODIS operational surface reflectance product is better than .5% reflectance or 5% of the signal - which ever is greatest, with slight variation from band to band.

Product status updated on October 2003

Supporting Studies:

Title: Atmospheric correction of MODIS data in the visible to middle infrared: first results
Author: Eric F. Vermote, Nazmi Z. El Saleous and Christopher O. Justice
Source: Remote Sensing of Environment, 83: 97-111.
[View Summary Results From This Document](#)

Additional Validation and Product Quality

[PI Maintained Validation Page](#)
[Product Quality Documentation for MOD09A1 - Terra](#)
[Product Quality Documentation for MOD09GHK - Terra](#)
[Product Quality Documentation for MOD09GOK - Terra](#)

Summary Figures and Tables

Figure 1: The validation of the atmospheric correction has been done partially by continuing to validate the aerosol optical thickness used in the correction algorithm by comparison to AERONET data as it is

MODIS example: "Accuracy Statements" (3/3)

Support material for each Accuracy Statement
- updated by product PI and validation community

EOS Validation Product Name--MOD09

MODIS land team validation

Summary Results from:

Atmospheric correction of MODIS data in the visible to middle infrared: first results

As they relate to the validation of MOD09

Authors: Eric F. Vermote, Nazmi Z. El Saleous and Christopher O. Justice

Source: Remote Sensing of Environment, 83: 97-111.

Link to: [Access Publication](#)

Abstract: The MODIS instrument provides major advances in moderate resolution earth observation. Improved spatial resolution for land observation at 250 and 500 m and improved spectral band placement provides new remote sensing opportunities. NASA has invested in the development of improved algorithms for MODIS, which will provide new data sets for global change research. Surface reflectance is one of the key products from MODIS and is used in developing several higher-order land products. The surface reflectance algorithm builds on the heritage of the Advanced Very High Resolution Radiometer (AVHRR) and SeaWiFS algorithms, taking advantage of the new sensing capabilities of MODIS. Atmospheric correction by the removal of water vapor and aerosol effects provides improvements over previous coarse resolution products and the basis for a new time-series, which will extend through to the NPOESS generation imagers. This paper summarizes the first evaluation of the MODIS surface reflectance product accuracy, in comparison with other data products and in the context of the MODIS instrument performance since launch. The MODIS surface reflectance product will provide an important time-series data set for quantifying global environmental change.

Summary Figures and Tables

Figure 1: The validation of the atmospheric correction has been done partially by continuing to validate the aerosol optical thickness used in the correction algorithm by comparison to AERONET data as it is

http:landval.gsfc.nasa.gov/LPVS

Matches WGCV page layout and graphic

Welcome to the Land Product Validation Subgroup - Microsoft Internet Explorer

File Edit View Favorites Tools Help

CEOS WORKING GROUP ON CALIBRATION & VALIDATION
Committee on Earth Observing Satellites
Land Product Validation Subgroup

Home Landcover Biophysical Fire/Burn Surface Rad

Subscribe!
LPV subgroup topical mailing lists:
Subscribe: [v]
Unsubscribe: [v]
List: [v]

Announcing...
Call for papers for LPV special issue in IEEE Transactions on Geoscience and Remote Sensing.

Organization:
LPV is a subgroup of the Working Group on Calibration and Validation.

WGCV is a standing Working Group of the Committee on Earth Observing Satellites

CEOS Calendar

Mission
To foster quantitative validation of higher-level global land products derived from remote sensing data and to relay results so they are relevant to users

Background
The subgroup on Land Product Validation (LPV) is one of six subgroups of the Working Group on Calibration and Validation (WGCV), which itself is one of two standing working groups within the Committee on Earth Observing Satellites (CEOS, see also [CEOS structure](#)). The six WGCV subgroups are:

- Infrared and Visible Optical Sensors (IVOS)
- Atmospheric Chemistry (AC)
- Microwave Sensors (MS)
- Synthetic Aperture Radar (SAR)
- Terrain Mapping (TM)
- Land Product Validation (LPV)

The Land Product Validation subgroup arose out of the recognition in the late nineties that standardized approaches to global product validation were essential for wide acceptance and use of proposed global land products. Several programs at the time were aimed at global monitoring of Earth processes, many with plans to distribute higher level data products. A common approach to validation would encourage widespread use of validation data, and thus help us to move toward standardized approaches to global product validation. With the high cost of in-situ data collection, the potential benefits from international cooperation are considerable and obvious.

Previous requests for assistance from the original International Global Observing Strategy (IGOS) pilot projects and two subsequent ad hoc meetings of the WGCV identified a clear need for improved international collaboration concerning the validation of land products derived from Earth observing satellites. A new subgroup within the WGCV was proposed to the CEOS Plenary in Stockholm at the end of 1999, receiving full support. The LPV was officially adopted as a subgroup at the WGCV-17 meeting in October of 2000.

The LPV subgroup activities are divided up into four themes that complement the research agenda of the Global Observations of Forest and Land Cover Dynamics (GOF/C/GOLD) program, namely biophysical products, fire/burn scar detection, and land cover mapping. In addition to the GOF/C/GOLD themes, the LPV subgroup includes an Albedo/Surface Radiation thematic group. Working with GOF/C/GOLD, who seek the common goal of coordinated validation of fire products by standardized protocols, LPV aims for similar coordination for all land products.

Pull-down menu for main topical areas:

- Land cover
- Biophysical
- Fire/Burn
- Surface Radiation

Each pull-down lists:

- Background
- Producers *
- Meetings
- Case studies
- Intercomparisons

* input needed

Quick links to:

- Listserves
- Announcements
- WGCV
- CEOS and
- CEOS calendar

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LPV concluding remarks

- Defining user accuracy requirements and getting users to respect product accuracy remains a challenge
 - use validation site where site contacts are using the MOD res. data
- There are no established standards on how to relay product accuracy to users
 - “confidence layers” are likely to be the best approach
- Perhaps WGCV has not been consistent among subgroups (“land”/ “atmosphere” or “biophysical”/“atmospheric chemistry”)
- WGCV may need to integrate better with the Ocean Color community
- **Multi-sensor products offer great potential. The related algorithms will require an understanding of the accuracy of each sensor’s input. A demonstration of this might help justify proper cal/val to the GEOSS principals.**